Customer No.: 31561
Docket No.: 13041-US-PA
Application No.: 10/710,732

REMARKS

Present Status of the Application

The Office Action dated March 7, 2006 rejected claims 1-20 under 35 U.S.C. 102(e), as being anticipated by Yang (US 6,569,700). Claims 1-20 remain pending in the present application.

Applicant has most respectfully considered the remarks set forth in this Office Action. Regarding the obvious rejections, it is however strongly believed that the cited references are deficient to adequately teach the claimed features as recited in the presently pending claims. The reasons that motivate the above position of the Applicant are discussed in detail hereafter, upon which reconsideration of the claims is most earnestly solicited.

Discussion of Office Action Rejections

Applicants respectfully traverse the 102(e) rejection of claims 1-20 because Yang (US 6,569,700) does not teach every element recited in these claims.

In order to properly anticipate Applicants' claimed invention under 35 U.S.C 102, each and every element of claim in issue must be found, "either expressly or inherently described, in a single prior art reference". "The identical invention must be shown in as complete details as is contained in the .... claim. Richardson v. Suzuki Motor Co., 868 F. 2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." See M.P.E.P. 2131, 8th ed., 2001.

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The present invention is in general related to a method of fabricating a photodiode as claim 1 recites:

Claim 1. A method of fabricating a photodiode, comprising the steps of:
providing a substrate;
forming a well region of a first conductive type in the substrate;
forming an isolation structure in the substrate to define a photosensitive area on the substrate;
forming a plurality of trenches in the well region of the substrate within the photosensitive area; and
forming a doped layer of a second conductive type over the substrate, wherein the doped layer covers the interior walls of the trenches and the surface of the substrate within the photosensitive area.

On the other hand, Yang teaches forming a plurality of trenches 58 (Figures 3-4) in which insulating material 48 is subsequently filled into the trenches to form an isolation region 58 (Figure 5, col. 3, ln. 11-24) in order to define the photosensing region 46. Accordingly, Yang fails to teach or suggest forming a plurality of trenches in the well region of the substrate **within** the photosensitive area 46. Instead, the trenches 58 of Yang are formed around the outside of the photosensitive area 46. Accordingly, Yang also fails to teach forming a doped layer that covers the interior walls of the trenches and the surface of the substrate within the photosensitive area because the trenches of Yang are STI trenches formed **outside** the photosensitive area. Thus, Yang fails to teach every element in claim 1.

Therefore, Applicants respectfully submit that independent claim 1 patently defines over the prior art reference, and should be allowed. For at least the same reasons, dependent claims 2-

15 patently define over the prior art as a matter of law, for at least the reason that these dependent claims contain all features of independent claim 1.

The present invention also provides anther method of fabricating a photodiode as claim 16 recites:

Claim 16. A method of fabricating a photodiode, comprising the steps of:
providing a substrate;
forming a well region of a first conductive type in the substrate;
forming an isolation structure in the well region of the substrate to define a photosensitive area on the substrate;
forming a plurality of trenches in the substrate within the photosensitive area;
forming a buffer layer over the substrate, wherein the buffer layer covers the interior walls of the trenches and the surface of the substrate within the photosensitive area;
forming a doped layer of a second conductive type over the buffer layer; and
performing an annealing operation to drive dopants within the doped layer into the buffer layer and form a junction of the second conductive type and the first conductive type within the buffer layer.

As discussed in the above, Yang fails to teach or suggest forming a plurality of trenches in the substrate within the photosensitive area. Additionally, Yang also fails to teach forming a buffer layer to cover the interior walls of the trenches and the surface of the substrate within the photosensitive area and forming a doped layer of a second conductive type over the buffer layer. Instead, Yang teaches forming a polysilicon layer 66 over the surface of the walls of the trenches outside the photosensitive area and then driving the dopant in the polysilicon layer to diffuse into the p-type substrate 44 to form the doped region 52 in the substrate that surround the bottom and the walls of the shallow trenches 58. Contrary to the Office's assertion, the polysilicon layer 66

and the doped region 52 of Yang can not be comparable to the buffer layer and the doped layer of the instant case. The polysilicon layer 66 (the alleged buffer layer) of Yang is not formed over the surface of the walls of the trenches within the photosensitive area, and the doped region 52 (the alleged doped layer) of Yang is not formed over the polysilicon layer 66. In fact, the doped region 52 of Yang is formed underneath the polysilicon layer 66 (the alleged buffer layer).

Moreover, Yang definitely fails to teach or suggest "performing an annealing operation to drive dopants within the doped layer into the buffer layer and form a junction of the second conductive type and the first conductive type within the buffer layer". Instead, Yang teaches performing a thermal process to cause dopant in the **alleged buffer layer** (the polysilicon layer 66) to diffuse into the substrate 44 to form the **alleged doped layer** (doped region 52) (col.2, ln 66-67 thru col. 3, ln. 1-10).

For at least the foregoing reasons, Applicants respectfully submit that independent claim 16 patently defines over the prior art reference, and should be allowed. For at least the same reasons, dependent claims 17-20 patently define over the prior art as well.

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CONCLUSION

For at least the foregoing reasons, it is believed that the pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,

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